GOVERNMENT OF BOMBAY.

REPORT

ON THE

WORKING OF THE DEVELOPMENT DIRECTORATE

For the Year Ending 31st March 1922.

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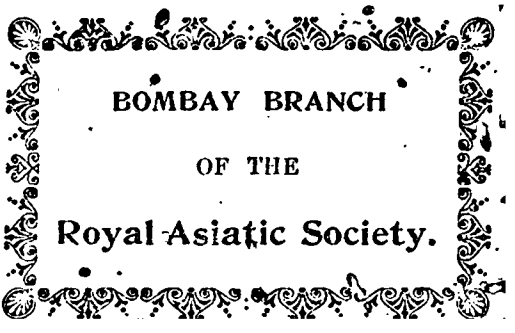

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of

The Director of Development, Bombay.

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REPORT ON THE WORKING OF THE DEVELOPMENT DIRECTORATE FOR THE YEAR ENDING 31st MARCH 1922.

THE year 1921-22 has been marked by steady progress and, although the set-backs inseparable from the initiation of a project of such magnitude have been met, it may fairly be said that the bulk of the difficult preliminary work has been accomplished and that the various schemes referred to in the last report have been successfully launched. In the present survey of the progress made it is proposed to deal with various parts of the Project in the same order as on the former occasion.

BACK BAY RECLAMATION.

2. *Preliminary Layout.*—A preliminary layout plan of the reclamation, prepared by Mr. W. R. Davidge, F.S.I., A.R.I.B.A., Consulting Town Planner, was received in India in May 1921, and a copy on a reduced scale will be found in the pocket of this report, Plate I. The plan was submitted for criticism to the various local bodies in Bombay and, though the replies indicated general approval of the proposals, a number of useful suggestions were made. Among the more important of these, the view was generally held that the proposed 20 feet promenade along the sea front was too narrow and that it should be widened to 40 feet at least, also that it was not desirable to build on the Coopefage or on the Marine Lines Maidan. The replies were carefully considered by the Advisory Committee and, together with their recommendations, were forwarded to the Consulting Town Planner for further examination. There is no doubt that a promenade of at least 40 feet in width is desirable, whilst there is no intention to build on any existing open spaces at present, and, in any case, not until the public have had the fullest opportunity of expressing their opinions on the subject.

3. The plan provides for a system of roads laid down N. W. and S.W., in the direction of the prevailing winds, and for a central open space running N. E. and S.W. with its axis aligned on the University Clock Tower, the semi-circular arrangement of the main roads at the Southern end being intended to facilitate the working of the tramway service. To the south, the military area shown is that allotted for the purpose

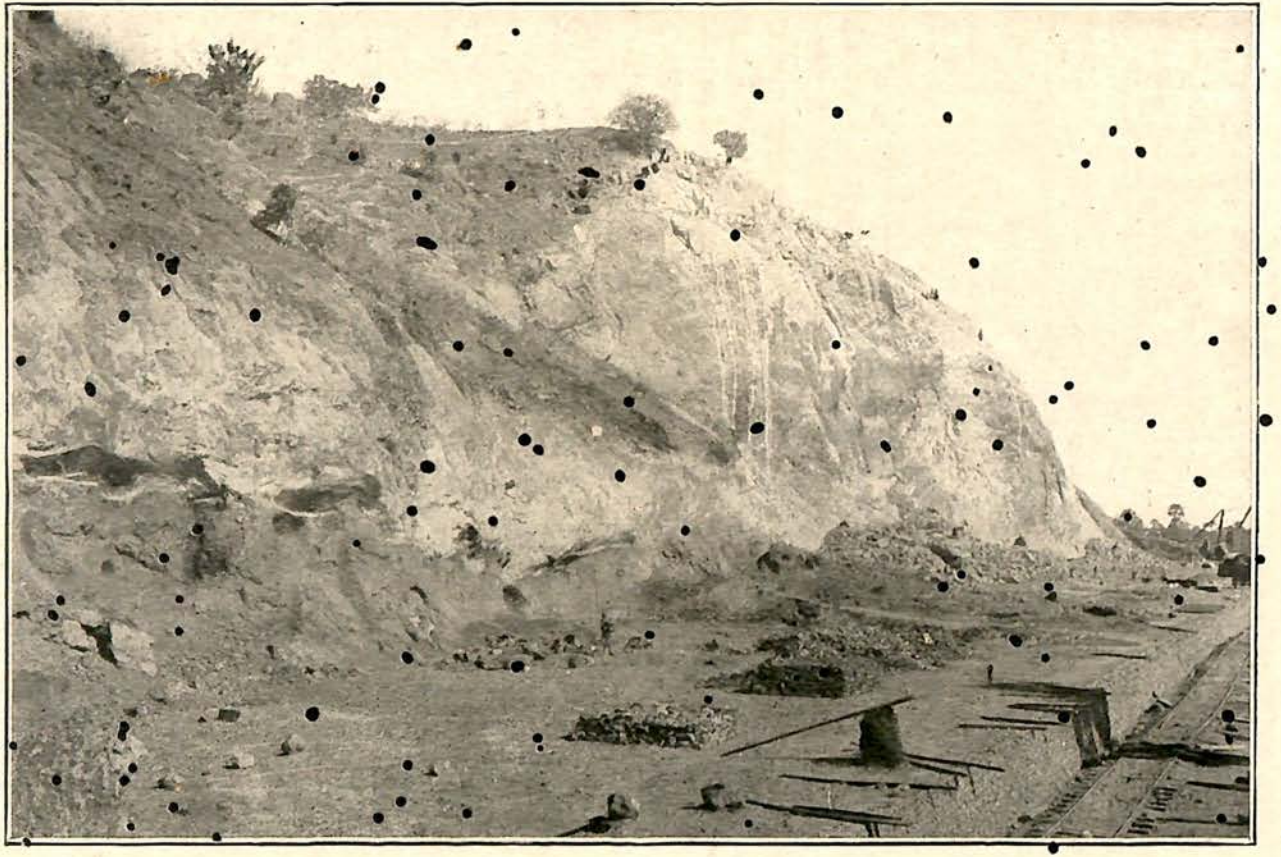
as the result of the agreement referred to in paragraph 5 of the last report. Details of the settlement arrived at were published in a Government Press Note No. S. A.-4755 of 9th December 1921, which is reprinted for ease of reference as Appendix A to this report. The total area of the reclamation is 1,145 acres, and the preliminary layout plan provides for about 22 lakhs square yards nett building area.

4. *B. B. & C. I. Railway South of Churchgate Station.*—Notice has been given by the Secretary of State to the B. B. & C. I. Railway Company requiring them to relinquish to Government the line south of Churchgate Station when called upon to do so, at any time after 1922, subject to the new termini for local and long distance traffic at Churchgate and Grant Road, respectively, having been constructed and the electrification completed. Under this arrangement the Bombay Government is responsible for the cost of replacing this section of the B. B. & C. I. Railway, should such restoration be found necessary in the future.

5. Government, accordingly, in February 1921, addressed the local bodies in Bombay on the subject pointing out that with the removal of the Cotton Green to Sewri, Colaba would gradually become a residential suburb, and that motors and the tram service would probably form a more convenient means of communication between Colaba and the Fort Area than a railway to Churchgate, which, it was considered, would have to be constructed in a subway to be built in the reclamation. Opinions were invited on the point and Government expressed themselves as doubtful whether the expense of constructing such a subway would be justified.

6. The replies received from local bodies during the year under review showed a consensus of opinion that the cost of a subway in the reclamation, merely to continue the B.B. & C.I. Railway south of Churchgate, would not be justified in view of the fact that the reclamation would be served by wide roads and a well planned tram service. The Municipal Corporation, however, suggested that the B. B. & C. I. Railway south of Grant Road should be sunk underground, and that a circular system of underground railways should be provided, connecting up the main railway long distance termini and the principal parts of the City, and extending, if possible, to the Back Bay Reclamation.

7. *Possible Underground Railway in the future.*—The matter was considered by the Advisory Committee who accepted the generally expressed view regarding the question of a subway to continue the B. B. & C. I. South of Churchgate Station, but recorded the opinion that looking



KHANDIVLI, QUARRY FACE AND FLOOR, WITH SIDINGS.

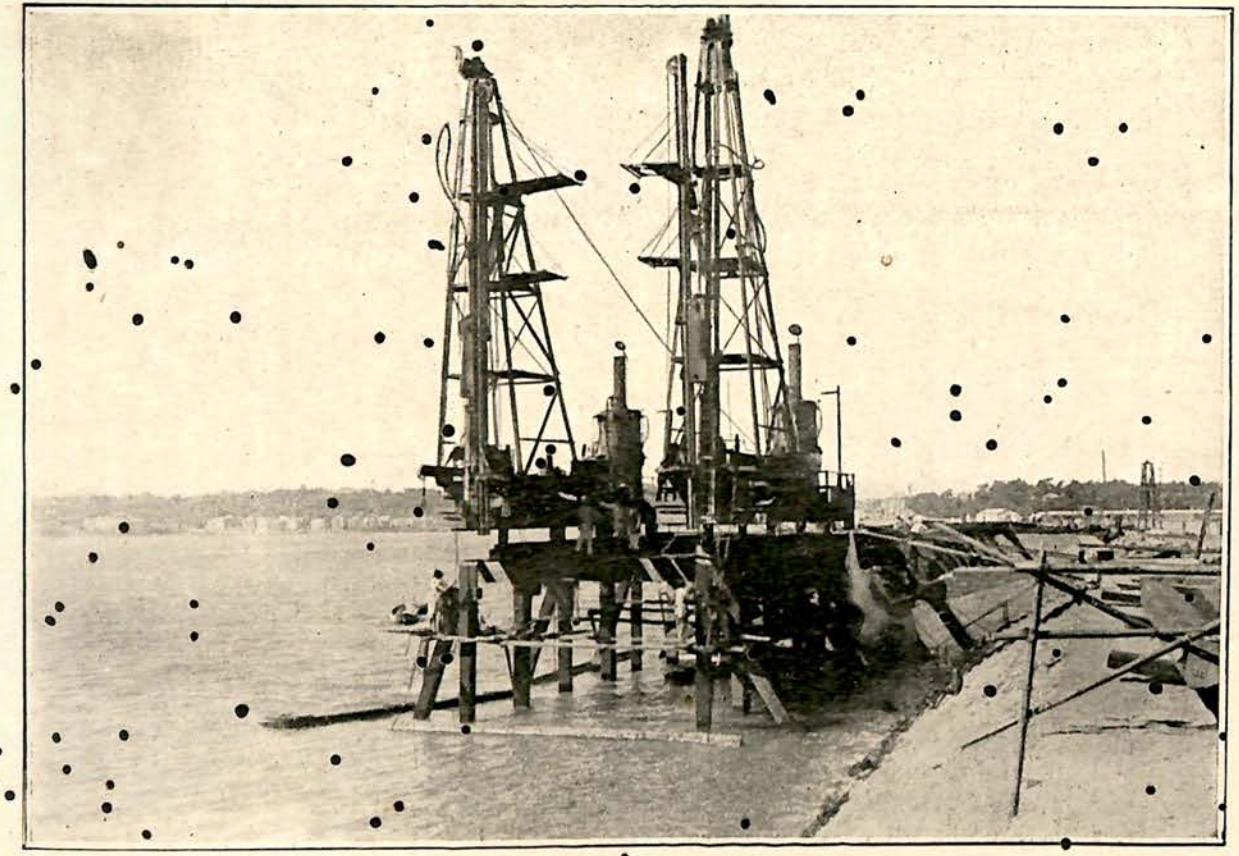
to the requirements of the future, a circular underground railway system on the lines suggested by the Municipal Corporation would eventually be necessary to serve the traffic needs of the City, and recommended that this should be borne in mind in laying out the reclamation. The opinions of all concerned were forwarded to the Consulting Town Planner for consideration in connection with future layout plans. The construction of a system of underground railways in Bombay can hardly be considered to be a question of practical politics at present, looking to the large financial liabilities already incurred on schemes of development; but the view will probably find general acceptance that the question is one which will eventually have to be submitted to expert examination as to its practicability and cost.

8. *Estimated Cost of the Reclamation.*—In July 1921, in reply to a representation by the Indian Merchants' Chamber and Bureau (*vide* Press Note No. S.A.-3709, dated 20th September 1921) Government gave certain figures of the cost of the Back Bay Reclamation which showed that, assuming the adoption of Mr. Davidge's preliminary layout plan, Plate I, the cost of the land available for building, including interest throughout at 7 per cent., would, in June 1929, have amounted to just under Rs. 28 per square yard. On the 31st March 1922, the detailed estimates had been practically completed, and the final figures show no appreciable difference from those given last year, so that the rate of Rs. 28 per square yard in June 1929 is not likely to be exceeded. On the contrary, the probability is that the actual figure will be less, because the calculation by which Rs. 28 per square yard was arrived at took no account of possible sales of land prior to 1929. It is expected, however, that land will be available for sale before that date and, although it is impossible to forecast what quantity of land it will be possible to sell, or what prices will be realised, it is important to note that any sales before 1929 will have the effect of reducing the cost per square yard as at present estimated.

9. *Kandivli Quarry.*—In its engineering aspect, the work on the Back Bay Reclamation, at present, falls under three main heads; the Kandivli Quarry, the work at Marine Lines and the work at Colaba. The quarry consists of a large mass of altered trap rock, situated about 1 mile to the east of Kandivli Station, on the B.B. and C.I. Railway, which presents a natural, almost vertical, quarry face 1,200 feet long, rising at the highest point to about 140 feet. The quarry may be said to have been completed during the year under review and regular production was started in March, in which month 31,500 tons of stone were

despatched to Marine Lines. In clearing the quarry face, about 39 lakhs cubic feet of moorum and boulders were removed, leaving a level quarry floor about 150 feet wide separating the quarry face from the sidings laid parallel to it. These sidings are at the lower level, the floor of the wagons being on a level with the quarry floor which thus forms a platform from which the wagons can be conveniently loaded. During the year some 3,200 feet of air mains were provided to carry compressed air for the drills, 4½ miles of railway track were laid and ballasted, and 1½ miles of roads constructed, whilst about 160 acres of land were cleared of jungle, levelled, drained and fenced. In April and May 1921, great difficulties were experienced owing to shortage of water. Two existing wells were deepened and two new wells were constructed, with the result that, on reaching depths varying from 70 to 100 feet, a good supply was obtained by the end of May. Three other wells were sunk during the year and the water difficulty is now believed to have been mastered.

10. The power house, workshops and stores were completed during the period under review. The former contains, besides the necessary boilers, one Ingersole-Rand duplex air compressor of 1,530 cubic feet free air capacity per minute, at 100 lbs. pressure, with three steam driven electrical generating sets, two of 170 and one of 63 K. W. capacity. The workshop is equipped with the necessary electrically driven machines for the repair of the plant, also a Leyner drill sharpening machine with oilfurnace and grinder. The store comprises a building 90′ × 45′ fitted with the necessary racks, bins, etc. Quarters for officers and subordinates have been provided, together with housing and sanitation for the labour force employed. A hospital with a ward of 6 beds, operating room and dispensary has also been built, and ample water supply laid on throughout the settlement. Of plant erected during the year, mention may be made of 2 Lidgerwood derricks of 15 tons capacity, 1 Ransomes and Rapiers 15-ton loco. crane, 5 similar 7-ton cranes and one Bucyrus steam shovel. Practically the only item remaining uncompleted at the close of the year was the crushing plant, for which the foundations and bins had been finished, the machinery, owing to late arrival in India, being only partly erected. When completed, this plant will have a capacity of 50 tons of crushed stone per hour with one crusher spare. The quarry, as it stands is equipped for a continuous output of 2,000 tons a day, the product varying from crushed stone and ordinary rubble to blocks weighing up to 10 tons. During the year, 132 twenty-ton side tipping wagons were received and erected by the B. B. and C. I. Railway for the carriage of the stone, and 106 more were on order at the end of March to make up the full number required.



PILE DRIVING FRAMES WORKING ON GANTRY AT MARINE LINES.

11. *Marine Lines.*—The preliminary work carried out at Marine Lines during the year comprised the laying of 4½ miles of railway track on the Kennedy Sea Face with a junction with the B. B. and C. I. Railway at Charni Road, the erection of a large concrete mixing plant, workshops, cement and engine sheds, quarters and offices, housing, water supply and sanitation for the labour force, and the electric lighting of the yard. The actual work on the sea wall was commenced on 1st December 1921, the first stage being the construction of a timber gantry or staging 2,100 feet in length, containing 74,000 cubic feet of Oregon pine, which was finished on 30th March 1922. The work was carried out by 2 pile driving frames, each working a 2-ton steam hammer, and forms a temporary falsework to carry two lines of railway on to which the loaded stone wagons are run, the contents being dumped to build up a rubble mound in the bed of the sea, below and around the timber staging. The arrangement permits the dumping of the smaller material inwards to make the core of the mound, whilst wagons containing larger stones are tipped outwards to form the faces.

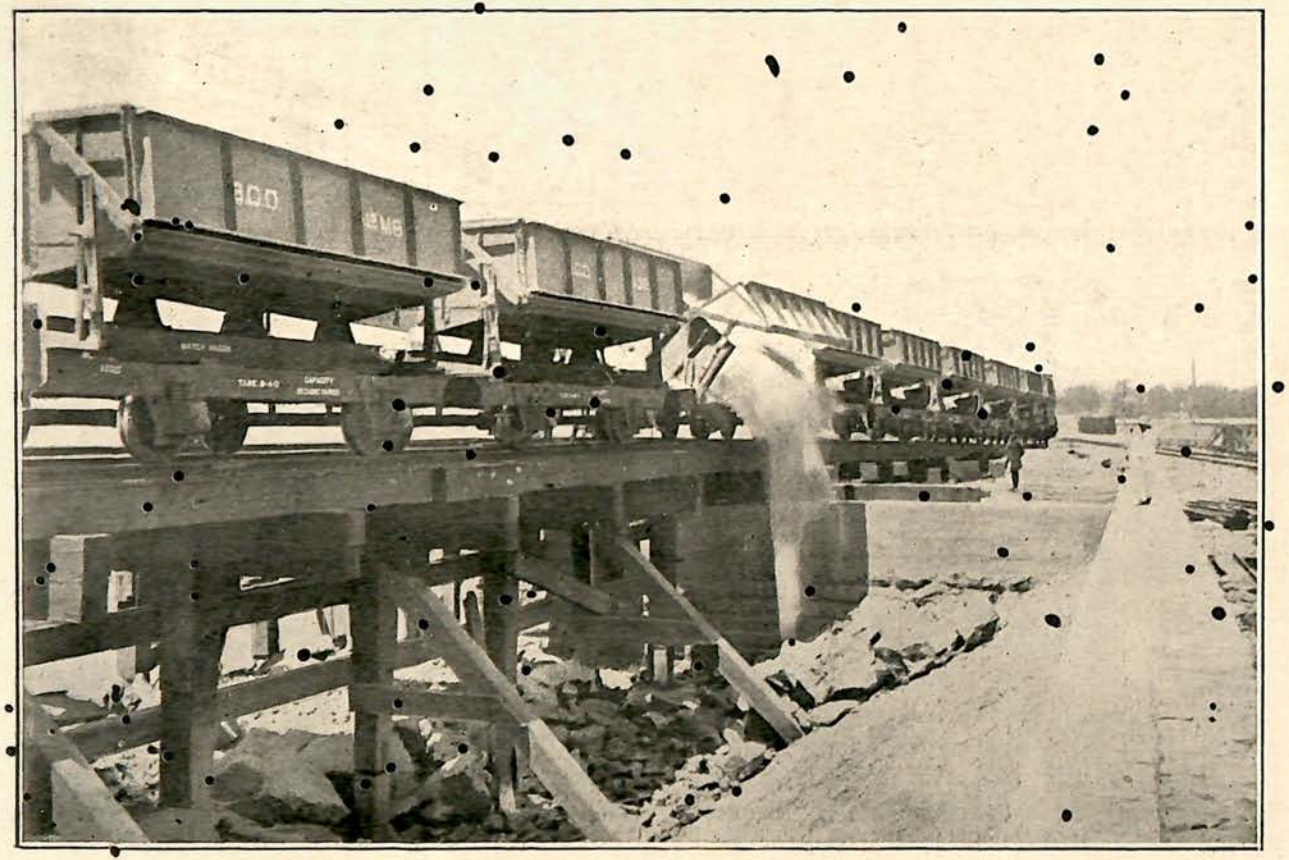
12. The tipping was started on 14th January 1922, and 32,180 tons of stone had been deposited at the end of the year. The rubble mound is to be finished off at H.W.O.S.T. level and a mass concrete wall will then be built upon the mound, the timbers of the staging serving as supports for the necessary shuttering. Preparations to start this work were in hand on 31st March 1922. At a later stage, all timber except that buried in the rubble mound will be dismantled and the two railway tracks will be replaced by one, laid on the top of the mass concrete wall, to enable the stone wagons to reach the further extensions of the staging to be built in subsequent years. The concrete wall will also carry a 12ft. 6in. gauge railway track on which will run a heavy crane for the purpose of placing in position the 10-ton blocks of stone which will form the permanent protection of the outer slope of the rubble mound. The crane will be of the portal type to enable the stone trains, conveying rubble to the work in progress beyond, to pass beneath it. In this way the construction of the wall will proceed in a regular sequence of operations at a rate, in subsequent years, of 3,000 feet per annum, until a junction is effected with the wall being built out from the Colaba end.

13. *Colaba.*—The first 2,000 feet of the sea wall from the Colaba end will be a mass concrete wall built directly on the reef, and work on this section of the wall is necessarily restricted to a portion of each tide during which the reef is exposed. Up to the 31st March the concrete

foundations for 1,300 feet of wall had been completed and the mass concrete superstructure was about to be commenced. It is hoped that the progress of the work will not be seriously interrupted by the monsoon, and that the section of 2,000 feet will be completed before the commencement of next working season. The further extension of the wall will be a mass concrete wall built on a rubble mound as at Marine Lines, and a railway is to be built to connect the works with the Kennedy Sea Face sidings and thus facilitate the transport of stone direct from the quarry. This railway will be ready for the commencement of the next phase of the work at Colaba by October 1922. The plant at present employed comprises light railway material, 2 steam cranes, 3 stone crushers, concrete mixing and air compressing plants, lighting and telephone services. During the year, arrangements have been made for the housing of the labour employed, with water supply and sanitary requirements. The necessity for working between tides has rendered the initial stages of the work at Colaba somewhat slow, and progress has been hampered by want of space. These difficulties, however, will disappear after the completion of the first section of 2,000 feet, and the work will then be carried on much more rapidly. The length of the sea wall, when completed from Marine Lines to Colaba, will be 21,578 feet, or just over four miles, the estimated quantities of material required being as follows :—

Rubble	92,23,280	c. ft.
Heavy pitching stone	34,65,500	„
Concrete	36,94,690	„

14. *Dredging and Pumping Plant.*—The dredger "Sir George Lloyd" arrived in Bombay harbour on 31st March 1922 and has since been dry docked and painted prior to laying up for the monsoon. The leading dimensions of the vessel are, length 226 feet, breadth 44 feet, draft 9 feet 4 inches. The propelling machinery consists of two sets of compound engines each developing 450 I.H.P. with oil-fired boilers. The pumping plant comprises a 42″ centrifugal dredging pump driven by a triple expansion engine of 3,000 H.P., and the suction head is fitted with a cutter weighing 11 tons driven by an independent set of compound engines. The dredger is capable of dredging 2,000 cubic yards of clay per hour from a depth of 70 feet below water level, and delivering the same through 5,000 feet of pipe line. The intermediate station, the " Colaba," arrived in Bombay a few weeks after the " Sir George Lloyd." The vessel is not equipped for dredging, but is fitted with a centrifugal pump similar to that of the " Sir George Lloyd " for the purpose of pumping



TIPPING STONE FROM GANTRY, MARINE LINES.

on, for another 5,000 feet, the material delivered by the latter. The two vessels together are therefore capable of delivering the pumped material at a distance of 10,000 feet from the point at which the dredging is being carried out. During the year the bulk of the material for the floating and shore pipe lines was received in Bombay, and arrangements were made to have the same put together in sections ready for use when required. The whole of the dredging plant was placed in charge of an experienced dredging master, sent from England by the Consulting Engineers, and a minimum staff was engaged for its proper upkeep pending the actual commencement of dredging operations.

15. The pumping will be commenced as soon as a sufficient length of the sea wall has been constructed, when a rubble bank will be run out from the existing foreshore to meet the end of the wall, and thus form a lagoon into which the pumped material will be deposited. Meanwhile further lengths of wall with additional rubble banks will enable successive sections of the filling to be taken in hand, until the whole reclamation is completed. The rubble banks will follow the lines of the principal roads running at right angles to the sea wall shown on the preliminary layout plan, Plate I. Before pumping commences, it is proposed to appoint a Committee of medical and sanitary experts to watch the conditions, and to advise as to the measures to be adopted to prevent any possibility of danger to the health of the community resulting from the operations. The total quantity of filling required is estimated at 25 million cubic yards.

EAST COLABA RECLAMATION.

16. Plate I shows the position of the proposed East Colaba Reclamation which is to be carried out at the same time as the larger work in Back Bay. The area to be reclaimed is 131·75 acres, and the net building area will be about 4 lakhs of square yards. The total expenditure is estimated at approximately Rs. 87½ lakhs, and, allowing for interest on capital throughout at 7 per cent., it has been calculated that the cost of each yard of the developed building area, at the end of the 6th year from the commencement of expenditure on the scheme, will be rather less than Rs. 26, assuming no land to have been sold until the whole work is completed. Further details were given in a Press Note No. S.A.-4828, dated the 14th December 1921, which is printed as Appendix B to this report. The Bombay Legislative Council having sanctioned the proposed expenditure during the current year at the session of the Council

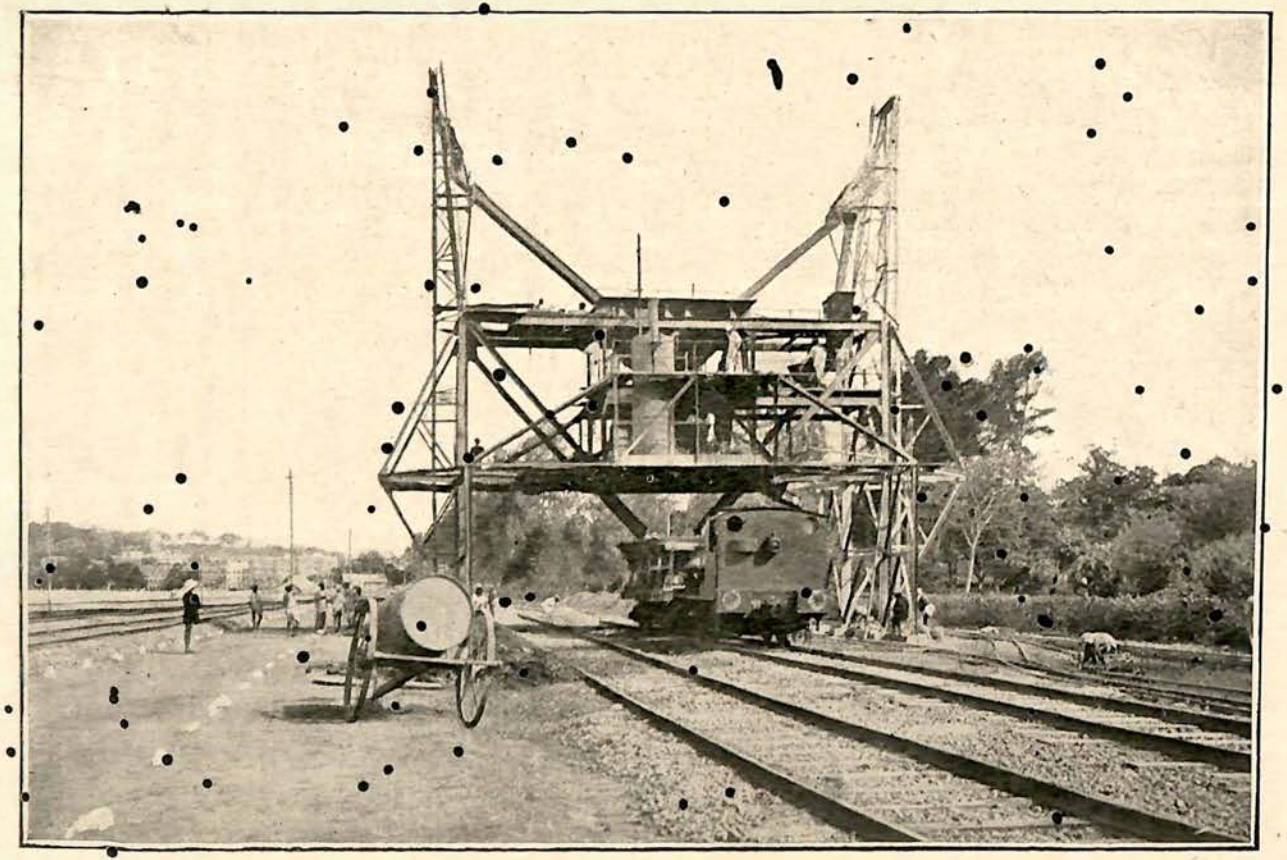
held in February 1922, the detailed estimates have been put in hand and it is hoped to commence the work next cold weather. The construction presents no special difficulties and the rubble wall will be built, as at Marine Lines, with stone brought from Kandivli. Owing to the comparatively sheltered position of the sea wall, it is expected that it will be possible to work during the monsoon months and thus, by ensuring a regular output of stone, to secure the more economical working of the quarry.

INDUSTRIAL HOUSING IN BOMBAY.

17. The programme provides for the completion of 50,000 tenements in eight years as follows:—

Year.	Number of chawls.	Number of tenements.
1921—22	15	1,200
1922—23	45	3,600
1923—24	75	6,000
1924—25	90	7,200
1925—26	100	8,000
1926—27	100	8,000
1927—28	100	8,000
1928—29	100	8,000
Total	625	50,000

It was originally contemplated that of the 50,000 tenements to be constructed, about 35,000 could be built on land in possession of the Improvement Trust or easily obtainable, and that for the remainder it would probably be necessary to reclaim part of the salt works in the North East of the Island. The present estimate of the number of tenements



CONCRETE MIXING PLANT AT MARINE LINES.

which it will be possible to build in Improvement Trust estates, is given below:—

Situation.	Number of chawls.	Number of tenements.
Naigaum	42	3,360
Worli	163	13,040
Sion-Matunga	25	2,000
The flats	25	2,000
Sewri-Wadala	80	6,400
Dharavi	90	7,200
Total	425	34,000

leaving land for 200 chawls, or 16,000 tenements to be obtained elsewhere. So far, the only land it has been possible to acquire outside Improvement Trust Schemes is that at DeLisle Road, which provides for 33 chawls or 2,640 tenements, and cost Rs. 21 per square yard, a rate which it would not be economically possible to pay, except for an insignificant proportion of the total area required.

18. Unfortunately, owing to the inevitable delays connected with land acquisition, neither the Directorate nor the Improvement Trust were able to obtain possession of land as early as had been contemplated, and this has somewhat hampered progress during the first year. The position with regard to land on 31st March 1922 is shown in the subjoined table.

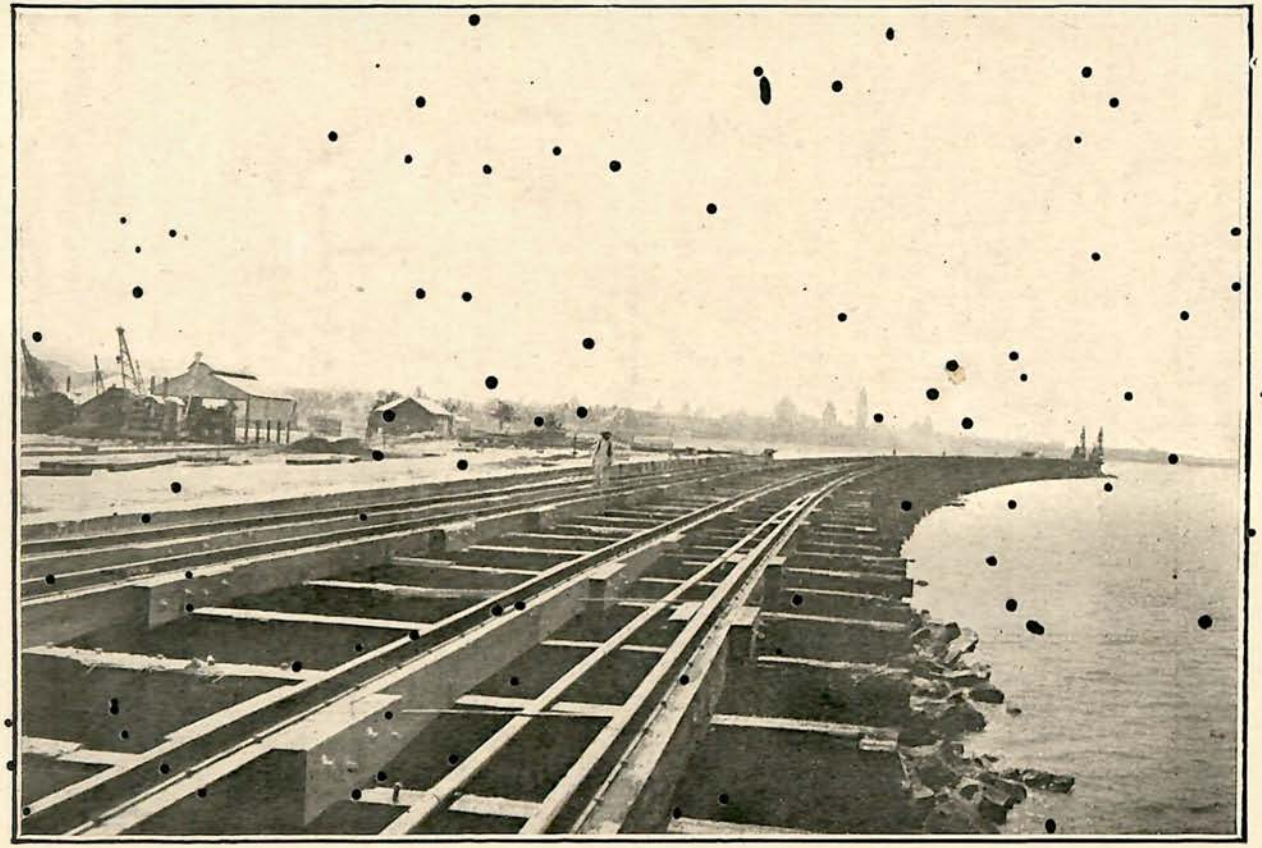
Situation.	Number of chawls and tenements which land in possession of Directorate, will accommodate.		Date Directorate obtained possession.
	Chawls.	Tenements.	
Naigaum	19	1,520	22nd March 1921.
DeLisle Road ..	33	2,640	12th November 1921
Worli	43	3,440	20th October 1921.

Work on these 95 chawls (7,600 tenements) was in active progress at the end of the year and copies of the layout plans adopted are shown on Plates 2, 3 and 4.

19. A second plot at Naigaum was handed over to the Directorate by the Improvement Trust shortly after the close of the period under review, as well as an additional large area at Worli; and these two together will provide for another 100 chawls or 8,000 tenements, so that at the date of issue of this report, land is in possession of the Directorate which will accommodate a total of 195 chawls or 15,600 tenements. This will suffice to carry the programme well into the year 1924-25, but negotiations are in progress with the Improvement Trust for the provision of further land at the dates it will be required, and investigations are also being carried out as to the possibility of reclamation in the North East of the Island. At the end of the year, the equivalent of 720 tenements had been completed as against the programme figure of 1,200, due mainly to delays caused by protracted acquisition proceedings; but it is confidently expected that the lost ground will be recovered during the current year, and that the work will be fully up to the programme by 31st March 1923.

20. During the year, the general design of the chawls has been very carefully reviewed in all details, and various modifications of previous plans have been introduced with a view either to improve the amenities, reduce the cost or speed up the output. A plan and elevation of the standard design adopted will be found on Plates 5 and 5(*a*) of this report. In the case of the chawls at Worli, pile foundations have been found necessary as the ground has recently been filled in by the Improvement Trust. The work at Naigaum and DeLisle Road is in charge of the Executive Engineer, No. 1 Housing District; No. 2 Housing District, was constituted towards the end of July 1921 and the Executive Engineer of the District has, since his appointment on 10th October 1921, been in charge of the work at Worli. After the monsoon, it is proposed to organise a third Housing District which will take over part of the large area at Worli. The Directorate will be in a position to commence letting out tenements after the coming rains.

21. It is not commonly realised what a large undertaking the construction of 50,000 tenements really represents. If we assume 5 occupants per tenement, including children, the total population of the chawls, when completed, will amount to 2,50,000, which is about the same as the population of Ahmedabad, or one-fifth of the present total population of Bombay City.



GANTRY COMPLETED TO 2,100 FEET, MARINE LINES.

PROVISIONS FOR THE EXPANSION OF INDUSTRIES OUTSIDE BOMBAY.

22. *Suburban Scheme No.* 1—*Kurla Kirol.*—This area, as stated in paragraph 12 of the last report, is to be developed for small factories and workshops which do not require large supplies of water. During the past working season the necessary surveys were made and a layout plan prepared providing for the factory sites, and for a siding from the G. I. P. Railway to a goods depot conveniently situated to serve the factories. A sufficient area has also been allotted for housing the workmen. No factory sites had actually been let by the end of the year, and it is not expected that many applications will be forthcoming until the present trade depression passes away. Meanwhile, the work of development will remain in abeyance.

23. *Suburban Scheme No.* 2—*Trombay North-East.*—This is the area referred to in paragraph 25 of the last report, which is to be allotted to certain offensive trades, such as the slaughter house, tanneries, etc. and for milch cattle stables. During the year the necessary surveys and estimates were prepared for the provision, in the first instance, of an area of 150 acres for the Tanneries to be displaced from Dharavi. The G. I. P. Railway also undertook and completed the survey and estimates for the extension of the Municipal Kutchra Siding from Chembur to Trombay to serve the area, and negotiations for its construction were in progress at the end of the year.

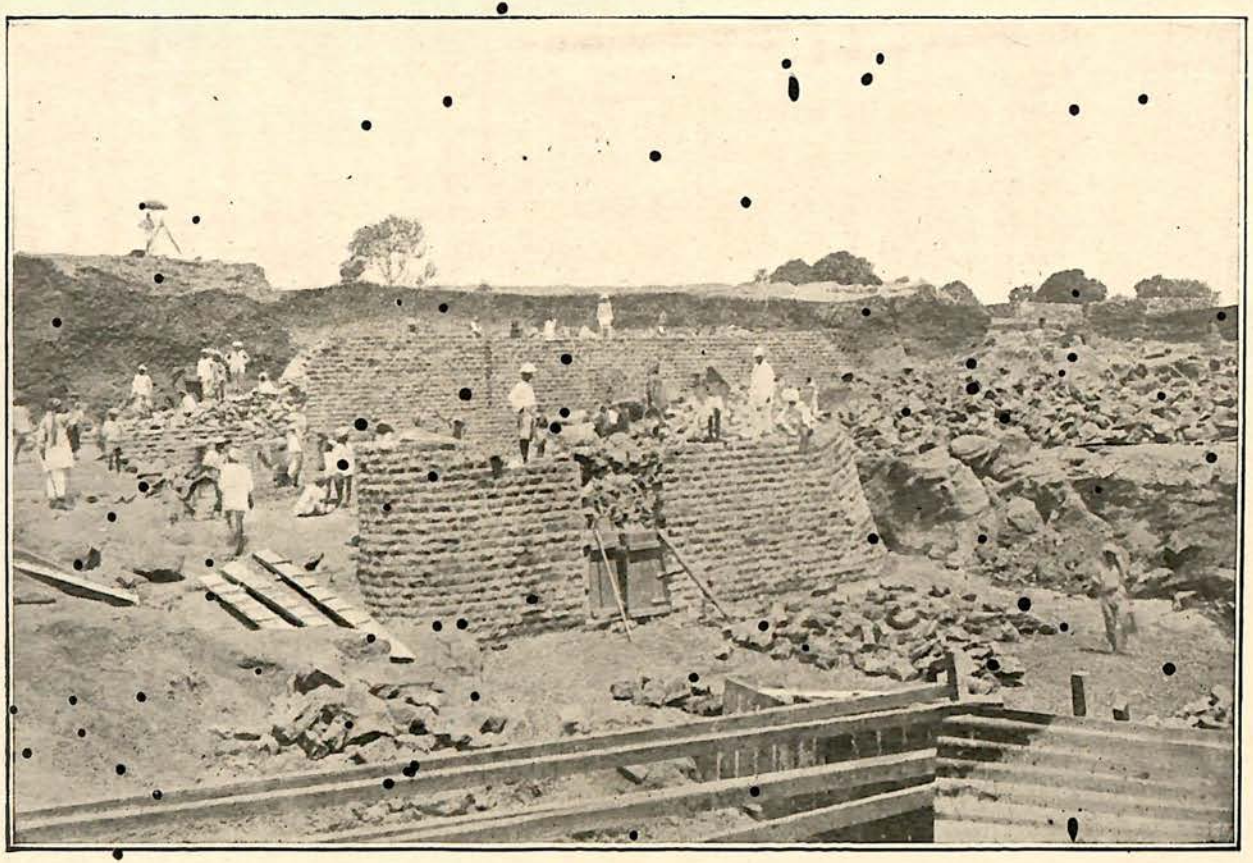
24. *Scheme No.* 15—*Ambarnath.*—During the period under review the first three factories at Ambarnath made considerable progress and two of them were practically completed by the end of March. The necessary roads to serve these factory sites were constructed by the Directorate, as well as a portion of the surface water drainage scheme. It was found necessary to increase the temporary water service to meet the needs of these factories and, although other enquiries were received regarding sites, it was not considered advisable to enter into further negotiations pending the provision of the permanent water supply. Designs and estimates were prepared and sanctioned for this scheme during the year. A barrage, with automatic gates, is to be constructed in the Ulhas River near Badlapur, with pump house and filtration plant. After filtration the water will be pumped through a steel rising main, for a distance of 2¼ miles, to a reservoir situated 200 feet above M.S.L., from which point it will be delivered to the industrial area by gravity. During

the year contracts were let for the supply of the pumping and filtration plant, water mains, barrage and reservoirs, and it is hoped to have the permanent water supply in working order by May 1923.

25. Unfortunately the Andhra Valley Electric Power Supply Company are at present unable to supply power, and it has been decided to provide a temporary plant to supply the factories nearing completion. This will be located at the point where a minimum cost liability for distribution is incurred, and permanent arrangements will be dealt with later as may be found necessary. Regarding transport facilities, a scheme for widening and bridging the main road from Kalyan to Ambernath has been prepared but will not be put in hand until the area develops further. Early in 1922, the G. I. P. Railway introduced a shuttle service for the benefit of work people travelling between Kalyan and Ambarnath, and additional facilities will be forthcoming as conditions demand them. The question of providing postal, telegraphic and telephonic communication on a scale commensurate with the demand is under consideration.

26. Surveys and layouts have been prepared for housing the workpeople as well as the subordinate and superior staff of factories, and the construction of the necessary buildings will be undertaken by the factory owners. The food supply of the increasing population has not been lost sight of, a site for a permanent bazaar has been chosen, and meanwhile, provisional arrangements have been made for a group of temporary shops. Sites for Post Office, Police, Hospital and a recreation ground have been allotted. The sanitary arrangements are on a temporary basis at present, in charge of a Sanitary Inspector, whilst the health of the population is looked after by a Health Officer with a temporary hospital and medical equipment. Suitable sites for cemeteries and burning ghats have been located.

27. The scheme of development provides, in addition to a filtered water supply, for the installation of a modern sewage disposal system, and all necessary preliminaries have been completed in connection with this. Apart from these two essentials, the housing conditions of the workmen will approximate to those of the ordinary village, except that the Directorate will take steps to prevent congestion by limiting the number of houses per acre. For the present, expenditure is being mainly confined to the provision of the water supply, without which no further progress is possible. When this is available, future development will be regulated by the demand for factory sites within the area.



ONSTRUCTION OF BARRAGE IN THE UHLAS ' RIVER NEAR BADLAPUR. AMBARNATH WATER SUPPLY.

SUBURBAN DEVELOPMENT IN SALSETTE AND TROMBAY.

28. *Water Supply.*—In 1919 an arrangement had been come to between Government and the Bombay Municipality for the distribution of water from the Powai Lake to certain areas in Salsette, and the Sanitary Engineer to Government had been entrusted with the preparation of the necessary scheme. On the subsequent decision of the Corporation to lay additional mains from Tansa, the Development Department, to which the question of the water supply of Salsette had, in the meantime, been transferred, reopened the matter with the Corporation with a view to obtaining a supply from the mains of the latter generally, rather than an independent supply limited to one source only, the reasons being :—

(*i*) As Salsette is to be developed as an urban area, with a view to its ultimate inclusion in Bombay City, it would be preferable that there should be only one water system.

(*ii*) If the independent distribution scheme were carried through all the water from Powai Lake would be used for the western fringe of Salsette from Bandra to Vesawa, and no water would be available for Central Salsette or the east of Salsette or Trombay, except such small quantities as the Corporation might be able to spare from the Tansa mains.

29. As a result of the negotiations which followed, the Municipal Corporation agreed, in October 1921, to give to the Development Directorate, on behalf of Government, a total supply of 2,700,000 gallons per day for 10 years from the Tulsi and Vehar mains in Salsette, inclusive of the quantities at present supplied at Bandra, Kurla and elsewhere, at such points and by connections of such size as may be approved by the Municipal Commissioner. The principle underlying the arrangement being that, with the increase of the Tansa supply, water from Tansa and its future extensions alone should be given to Bombay Island, whilst the Salsette lakes should be utilised for supplying the areas around them. As a result of this settlement, a comprehensive scheme is in hand for the provision of a water supply for Trombay and the whole of Salsette as far north as Andheri and Ghatkoper. During the year under review a 6″ pipe was laid from the Tulsi main to improve the supply of Santa Cruz which is now receiving 40,000 gallons daily. The needs of the Co-operative Housing Societies in this area, *e.g.*, the Bombay Catholic Co-Partnership Housing Society and Goud Saraswat Housing Society are however increasing, and arrangements still further to improve the supply are being made.

30. The Development of the suburban area is being carried out by two methods :—

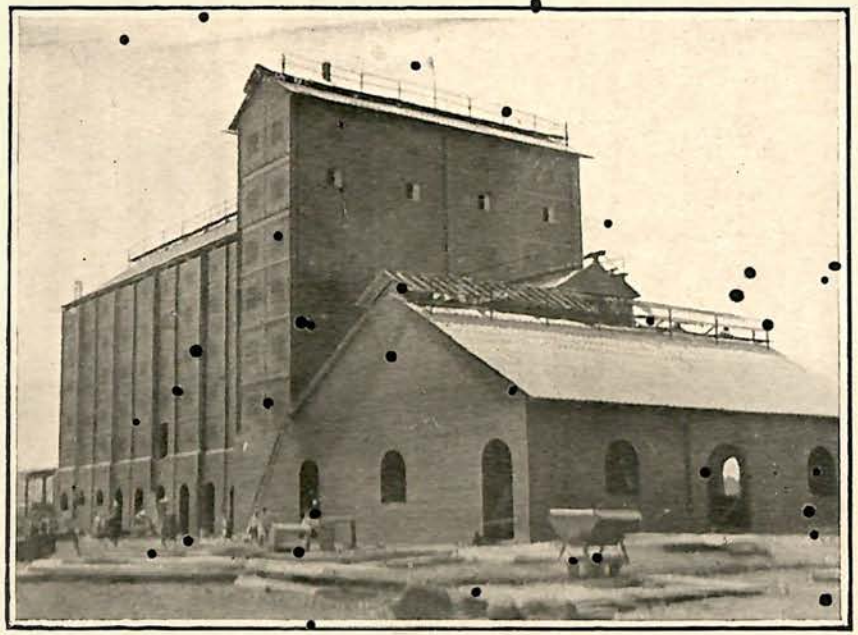
(*i*) Under the Town Planning Act.

(*ii*) By direct acquisition and subsequent development.

Generally speaking, the first method is applied to areas already being developed by private agency. The second is adopted in areas largely agricultural, where land is usually subdivided into numerous small holdings.

31. *Town Planning Schemes.*—The existing development in Salsette has been mainly in the hands of private owners, who, to say the least of it, have economised drastically in the matter of expenditure on roads and permanent open spaces. The resultant development is shown by detached clusters of houses, built to no regular alignment and to no set plan, the houses lying closely one behind the other, and approached, in the majority of cases, by narrow lanes or mere footpaths. In many instances the owners of the interior plots are unable to build for want of access to their holdings, and, since the essential preliminary to the provision of such amenities as water supply and drainage must be the construction of a system of roads giving access to every building plot, the only remedy lies in a Town Planning Scheme.

32. The method of carrying out a Town Planning Scheme may be briefly described. After a declaration of intention to form a Town Planning Scheme has been made by a local authority, time is given to all interested to submit to Government complaints or objections to the framing of a scheme. When Government, after considering any such objections, have sanctioned the preparation of a scheme the owners are required to prove their title to their holdings, the areas to which ownership is proved being called " the original plots." The scheme is then prepared by or for the local authority—as noted below, the Directorate is now able to assist local authorities by preparing schemes for them—and each owner is given a plot as near as possible conforming to that which he originally held, both as to position and area. This is called " the final plot," and the diminution in area between the original and final plots is the area of the undeveloped scheme which has been taken for roads and open spaces. An owner's contribution to the total cost of the scheme is based on the area he holds in proportion to the total area, and in practice usually amounts to from 35 to 40 per cent. of the accretion in value of his final, as compared with his original, plot. When the scheme is complete and the contributions of owners are declared, an Arbitrator is appointed by Government and all owners in the scheme may appear before him and make objections or complaints as to the final plots allotted to them or to



SULPHURIC ACID PLANT, AMBARNATH.

the contributions demanded, the Arbitrator having power to vary the layout of the scheme, amend or alter the final plots, or vary the contribution payable by any owner. When the Arbitrator has completed his work the body appointed to deal finally with all complaints or objections by owners in the scheme is the Tribunal of Arbitration, consisting of a President and two Assessors, whose decision is final, conclusive and binding on all owners in the scheme.

33. During the year three Town Planning Schemes have been finished, which with the two schemes completed in 1920-21 brings the total number of schemes carried out to five, viz:—

Scheme.	Area.	
Bandra No. 1 ..	5·7 acres	Completed in 1920-21.
Andheri No. 1 ..	10·4 ,,	
Santa Cruz No. 1	8·4 ,,	Completed in 1921-22.
Andheri No. 2 ..	76·4 ,,	
Borivli No. 1 ..	81·0 ,,	
Total ..	181·9 acres.	

In addition, the construction of roads in Santa Cruz Town Planning Scheme No. II (150 acres) was practically completed on 31st March 1922 including a new road to Juhu Island, and work in Ville Parle Town Planning Scheme No. I (61 acres) was commenced during the year.

34. Apart from schemes in the hands of the Engineers, the following Town Planning Schemes were under preparation on 31st March 1922:—

Serial No.	Scheme.	Area.
1	Bandra .. .. .. No. III	235 acres.
2	Bandra .. .. .. No. IV	40 ,,
3	Santa Cruz .. .. .. No. III	52 ,,
4	Santa Cruz .. .. .. No. IV	80 ,,
5	Andheri .. .. .. No. V	288 ,,
6	Ghatkoper .. .. .. No. I	41 ,,
7	Ghatkoper .. .. .. No. II	84 ,,
8	Malad .. .. .. No. II	48 ,,
9	Kandivli .. .. .. No. I	45 ,,
10	Ville Parle .. .. .. No. II	72 ,,
11	Ville Parle .. .. .. No. III	60 ,,

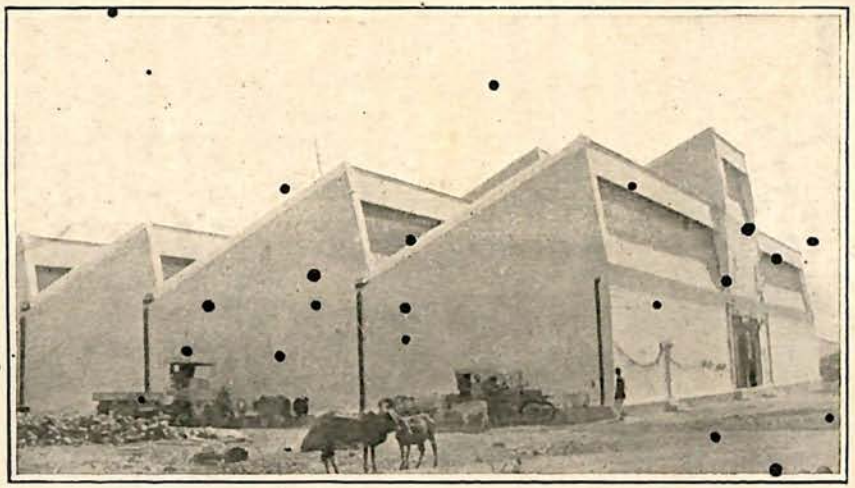
Nos. 5, 7 and 8 are all new schemes and the entire work of preparation is being carried out by the staff under the Land Manager of the Directorate. No. 2 is also a new scheme and will probably be prepared by the Municipal Engineer, Bandra. Nos. 1, 3, 4, 6, 9 and 11 will shortly be placed before the Arbitrator. No. 10 has been adjudicated upon by the Land Manager of the Directorate as Arbitrator, and has been forwarded to Government.

35. A Special Assistant Land Manager has been appointed, whose sole duty it will be to prepare and carry out Town Planning Schemes in the suburban areas under the supervision of the Land Manager, a plan which will enable the various suburban Municipalities and Notified Area Committees, when they wish to make use of this organisation, to have their schemes prepared expeditiously by an experienced staff, and thus ensure uniformity of development on up-to-date Town Planning lines.

The programme already in sight will be sufficient to provide full employment for the Land Manager's special staff for several years to come. The work involved in the preparation of schemes calls for an immense amount of labour, as each scheme may affect the property of anything from 50 to 250 owners, and the case of each of them has to be separately investigated with a view to providing a compact plot in the developed scheme, with ample road frontage and air space. It is not proposed to publish with this report the layout plans of Town Planning Schemes, as these are readily obtainable by all who are interested in any particular scheme. The actual work of development in all Town Planning Schemes is carried out by the staff of No. 2 Project Division, in addition to the suburban schemes now to be dealt with.

36. *Suburban Schemes.*—This designation is given to schemes falling under the second category referred to in paragraph 30, as well to miscellaneous engineering works in the suburban area, such as widening roads, etc. There are altogether 15 suburban schemes at present, as follows :—

Serial No.	Designation.	Area.
1	Kurla Kirol	582 acres.
2	Trombay North East	3,243 „
3	Trombay North West	1,727 „
4	Trombay West	3,680 „
7	Khar	177 „
8	Chapel Road, Bandra	28 „
10	Aerodrome near Gilbert Hill	300 „
11	Rann of Juhu	783 „
12	Bandra Ghodbunder Road widening ..	
13	South Salsette Drainage Scheme	
14	Mogra	93 „
15	Ambernath	1,289 „
16	Shahar	3,367 „
17	Salsette Trombay Railway	
18	Kirol North	56 „



LEATHER CLOTH FACTORY, AMBARNATH.

Nos. 1, 2, and 15 have already been dealt with in this report, Nos. 3. 4, 7, 8, 16 and 18 comprise areas which it is proposed to develop for residential purposes. It is not however the policy of the Directorate necessarily to acquire all land in such schemes, and owners who wish to retain land are being allowed to do so, provided they agree to build within a stated time, in conformity with rules laid down by the Directorate, and to pay a reasonable contribution towards the cost of development, such contribution being made in cash or in land, or partly in one form and partly in the other, at the option of the owner. So far, this policy has met with considerable success; the apprehensions regarding "wholesale confiscation" of land have been largely allayed; and owners are showing increasing willingness to come to terms with the Directorate, realising that without co-operation with the latter the development of their property is in most cases a difficult, if not impossible, business.

37. *Suburban Scheme No. 7—Khar.*—This is one of the first schemes selected for early development and actual work on the scheme was being begun at the end of the year. The scheme, the layout plan of which appears on Plate VI, covers an area of about 177 acres, with a net building area of 132·39 acres divided into 863 building plots of from 500 to 1,000 square yards each. Prior to notification, in December 1920, the land was entirely undeveloped, there being only six houses in the whole area. The land was divided into no less than 350 holdings, the majority of the owners of which did not cultivate their land, and could not develop it for want of access. The scheme has existing frontages of 2,650 and 1,280 feet to the west and east of the Bandra Ghodbunder Road, respectively, and 2,380 feet to the Hill Road, which will be widened to 50 feet throughout its entire length. It is bounded by the B. B. and C. I. Railway on the east, by Danda village and the sea on the west, by Khar village and Bandra Town Planning Scheme No. III on the south, and by Santa Cruz Town Planning Scheme No. IV on the north. The plan of development provides for the continuation of all principal north and south roads to connect with the north and south roads of the adjoining town planning schemes. The area occupied by roads is approximately one-fourth of the total area, whilst a further 5 per cent. has been allotted for permanent open spaces. A new railway station will be constructed by the B. B. and C. I. Railway to serve the area.

38. For the purpose of a general description the scheme may be divided into four sections. That lying between the Bandra Ghodbunder Road and the B. B. and C. I. Railway, covering approximately 21 acres,

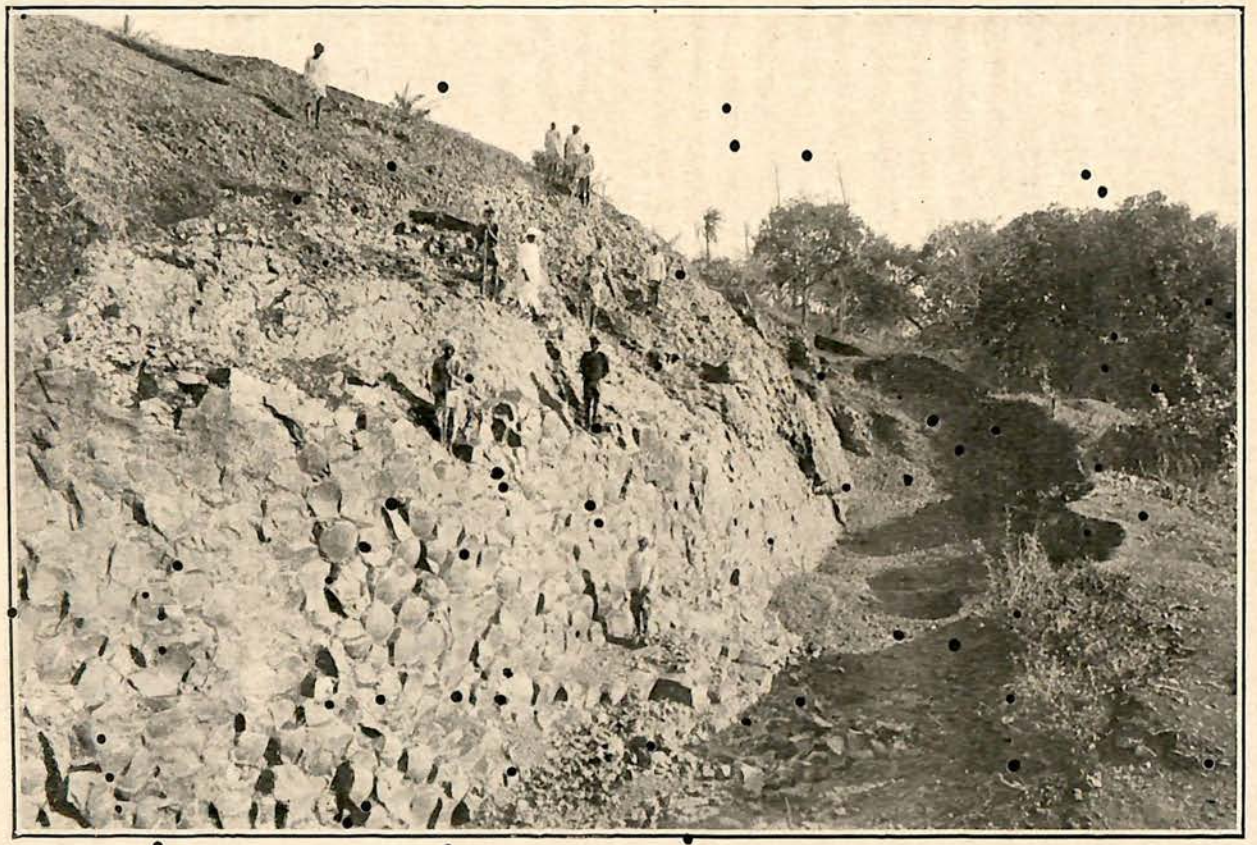
will be the business section and it will be noted that a site has been reserved for a market, in close proximity to the proposed new station. This section is, in the main, low-lying, and will require a considerable amount of filling. The extra expenditure involved will, however, be readily recouped, because the acquisition awards for the area are low, on account of the expenditure necessary to make it available for sale as level building sites ; and because, being the business area, the plots will command a higher price than those in areas reserved for purely residential purposes. The section lying between the Bandra Ghodbunder Road and Linking Road covers an area of 56 acres; and that between Linking Road and second Linking Road, containing the site reserved for a hostel for law students, covers approximately 47½ acres. The extreme western section comprises an area of about 54 acres and, situated though it is at some little distance from the railway station, will be in demand owing to its enjoyment of uninterrupted sea breezes.

39. When acquisition proceedings in the scheme were commenced, three building societies, *viz* .—

The Laxmi Co-operative Housing Society,
The Salsette Catholic Co-operative Housing Society, and
The Salsette Co-operative Land Development Society,

were already the owners of areas in the interior of the scheme, but could carry out no development as their lands were scattered and did not form a cohesive whole, and further had no frontage to roads, access being by rough cart tracks through the lands of adjacent owners. The areas owned by the Societies named total 96,800 square yards,or about 20 acres, and arrangements were completed during the year whereby each Society has secured a compact block of building plots in the developed scheme on favourable terms. Satisfactory settlements have also been arrived at with the owners of the few existing houses in the scheme, and the residences have been returned to their respective owners with a compact plot of land in place of the straggling and ill-shaped area originally owned.

40. A number of original owners in the scheme have been allotted building plots in lieu of receiving compensation for their lands and have expressed their intention of building upon the plots within the time limit of 3 years. The sale price of plots has been fixed at Rs. 5 to Rs. 6 per square yard for residential plots, except those fronting on the wider roads, for which Rs. 7 to Rs. 10 is being charged. A large number of applications for land in the scheme are being dealt with including one for 70,000



QUARRY FOR ROAD METAL, TROMBAY.

square yards by the Pathare Prabhu Co-operative Society, and another for 110 plots by the Parsi Central Association Co-operative Society. Arrangements for ample water supply for the scheme are being made and a sewage system will be included in the drainage scheme for Salsette. The cost of the scheme is estimated at Rs. 30,10,518 and the sale proceeds at Rs. 41,30,534. It is assumed, however, that about four years will be necessary to develop and sell the land, and the receipts have therefore been deferred over that period, the nett present value being put at Rs. 34,21,116, giving a surplus of Rs. 4,10,598. The disposal of any surplus is a matter for Government to decide on at a later date, but it will permit of further improvements in the way of tree planting, etc., whilst it must be recognised that the annual cost of road repairs must be met by the Directorate until there is a body of resident householders sufficient in number to bear the cost by way of municipal assessment.

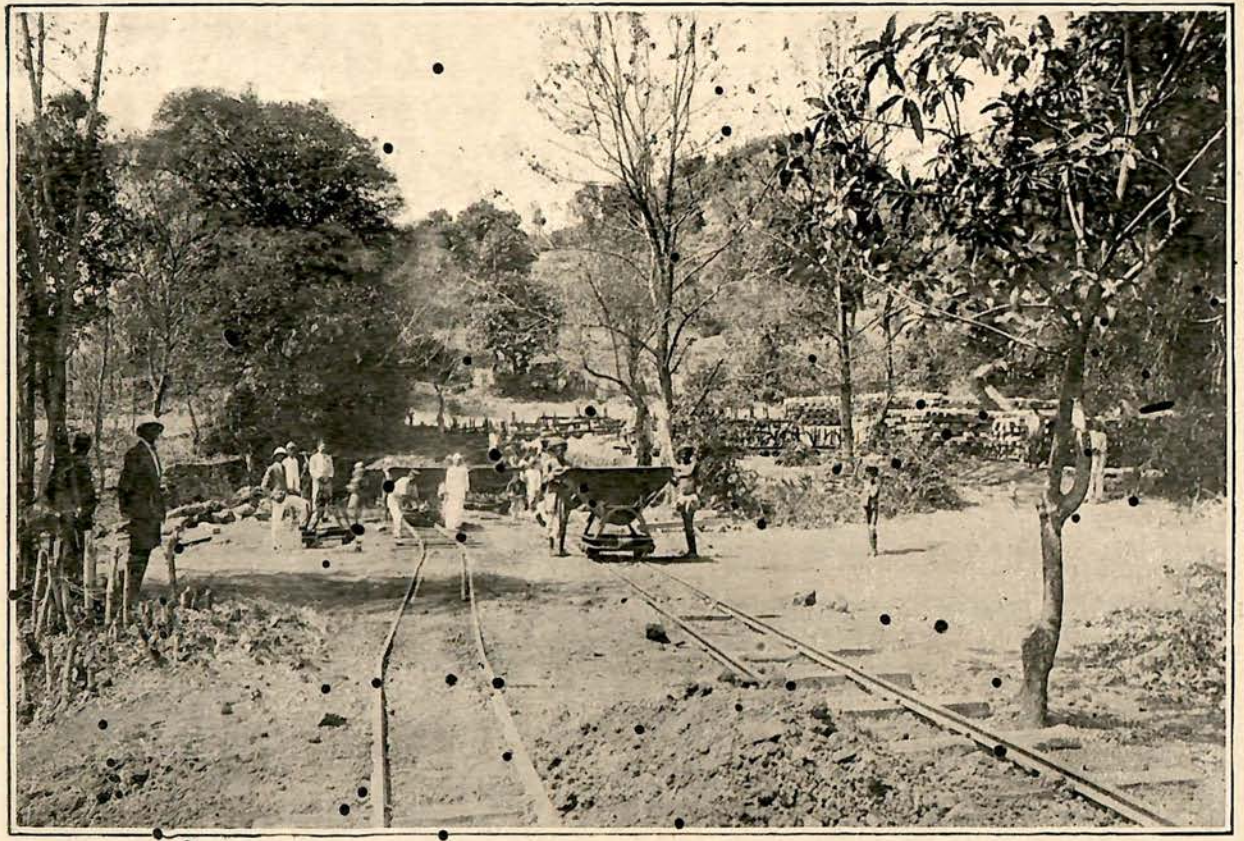
41. *Suburban Scheme No. 8—Chapel Road, Bandra.*—This scheme lies on the western boundary of Bandra and covers an area of 28 acres. It is bounded on the east by Chapel Road, to which it has a frontage of about 750 feet, on the south by private properties, on the west by Hill Road, and on the north by Bandra village and private properties. The layout plan will be found on Plate VII. Prior to notification, the San Sebastian Housing Society, the membership of which is confined to the lower middle classes, had acquired various holdings in the area totalling about 94,000 square yards, equal approximately to 19½ acres, or about 70 per cent. of the whole. The Society did not develop the land, presumably becaues the lands acquired were all interior holdings without access to existing roads. Government accordingly notified the lands in a compact area surrounding and including the areas acquired by the San Sebastian Society, with a view to permitting the development of the scheme as a complete entity, and thereafter to allot to the Society developed building plots in place of their original scattered and inaccessible holdings. No existing buildings were included in the notification. It will be seen that the Development Scheme provides for 126 building plots averaging between 500 and 1,000 square yards, about two-thirds being between 550 and 700 square yards. The roads in the scheme account for about 16 per cent. of the gross area, whilst land allotted for permanent open spaces accounts for a further 5 per cent. Besides the San Sebastian Society six other owners in the scheme have expressed a desire to accept developed building plots in lieu of receiving monetary compensation, the total gross area represented by these owners including the San Sebastian Society amounting to 22 acres. The balance of the land in the scheme available for sale to the public is 5 acres and the building plots will be sold at Rs. 5 per square

yard for about two-thirds of the area, and Rs. 6 to Rs. 9 per square yard for frontage plots to main roads, the latter having, of course, cost considerably more to acquire. There is an active demand for plots at these prices. Water supply will be available for all houses built in the scheme and a sewerage system will be included in the general drainage scheme for Salsette.

42. *Suburban Scheme No. 3—Trombay North-West.*—The portion of this scheme to be dealt with first is the Chembur section which comprises an area of 570 acres bounded on the west by the Chembur Mahul Road, on the north by the Municipal Kutchra Siding, and on the south by Vadavli village. A complete layout plan has been prepared and approved for the whole scheme, but, for the present, development will be confined to a section of 200 acres in the northern portion which will provide a net building area of 128·66 acres, served by the Municipal Kutchra Siding on which the G. I. P. Railway have agreed to run a train service between Chembur and Kurla. Arrangements to start the work of road making in the Northern Sector were being made at the close of the year. The scheme contains some of the best land in the suburban area, in the neighbourhood of Vadavli village, and when the completion of the Salsette Trombay Railway enables the southern sector to be developed, is expected to become one of the most popular suburbs. A direct road is to be constructed from Borla, in Trombay, to Kolwada, in Bombay, where it will cross the G.I.P. Railway Harbour Branch by an overbridge and connect with the Eastern Avenue, thus affording direct road communication with Bombay. The Chembur Trombay and Mahul Ghatkoper roads will also be improved in the future. As in the case of Suburban Schemes Nos. VII and VIII referred to above, settlements are being effected in this area with owners who wish to retain their land, and are willing to build.

43. *Suburban Scheme No. XVIII—Kirol North.*—This is an area of 56 acres immediately to the south of Ghatkoper which was originally notified by Government as a site for the Central Government Printing Press in December 1919, and has since been found to be unsuitable for the purpose. A detailed scheme of residential development has been approved and, owing to the proximity of the scheme to Ghatkoper, will afford an outlet for the already crowded population of that suburb.

44. *Suburban Scheme IV—Trombay West, and Scheme XVI—Shahar.*—These two large schemes depend on the completion of the Salsette-Trombay Railway and are not therefore being taken in hand for the present.



SUBURBAN SCHEME NO. 2 ; COMMENCEMENT OF WORK ON TANNERY AREA.

45. *Suburban Scheme No. X—Aerodrome near Gilbert Hill.*—This work was completed during the year at the cost of about Rs. 5½ lakhs. An area of 900×600 yards of Khajan land has been reclaimed with earth from Gilbert Hill at a cost of approximately Re. 1 per square yard. The total quantity of filling amounts to 120 lakhs cubic feet at a cost of Rs. 4-10-0 per 100 c.ft. The work was undertaken by Government to provide an aerodrome for civil aviation, but should it not be required for that purpose the area can easily be developed as a residential suburb for which its proximity to Andheri station renders it eminently suited.

46. *Suburban Scheme No. XI—Rann of Juhu.*—This comprises about 780 acres of Government land to the west of the Bandra Ghodbunder Road between Santa Cruz and Andheri, an area which has the benefit of uninterrupted sea breezes, its eastern boundary being contiguous to the sea at Juhu. The land however is lowlying and will require a considerable amount of filling to bring it up to the level of the Bandra-Ghodbunder Road. There is no immediate intention of bringing this land into the market, although the best method of filling it was under investigation during the year, but it forms a valuable reserve area for development when other land in the vicinity is fully built over.

47. *Suburban Scheme No. XII—Widening Bandra—Ghodbunder Road.*—The most important portion of this road, 4½ miles in length, from Turner Road, Bandra, to Andheri, was widened and re-made during the year; with the exception of three short lengths, *viz.*, through Khar village, at Santa Cruz and at a bridge at Irla, where completion was delayed owing to acquisition proceedings. The metalling is 40 feet wide from Turner Road to Santa Cruz, and 30 feet wide from Santa Cruz to Andheri. It is intended eventually to make the road 70 feet wide throughout, including footpaths, and the necessary land is being acquired. At the end of the year the provision of a tarred surface was being taken in hand.

48. *Suburban Scheme No. XIII—South Salsette Drainage.*—A report was received towards the end of the year from Mr. John D. Watson, the drainage expert, dealing with a proposal to intercept the drainage of the whole area by means of a main sewer running from Andheri to the north of Bandra, and thence turning eastwards, passing between Old and New Kurla, to an outfall in the creek north of Trombay. Such a proposal would involve a very heavy initial outlay, which Suburban Schemes in their early stages could hardly be expected to bear; and it is probable that an alternative suggestion of Mr. Watson's will be adopted, *viz.*,

to provide a number of smaller schemes for the different areas with more or less temporary outfall arrangements, so designed that the sewage from all outfalls can be drained eventually into the proposed main intercepting sewer when constructed at a later date.

49. In addition to the schemes referred to above, arrangements were made during the year to remove the lime burning industry at present established on the Kurla-Chembur Road to a new site on the Chembur-Ghatkoper Road. In connection with the pumping of petrol from Pir Pau it is necessary to close the creek which affords access for the boats bringing the raw material, in the form of shells, to the present site, and a Bill to effect the closing was passed by the Legislative Council in February 1922. The new bunder will be approached by the creek north of Trombay, and will be provided with necessary facilities, water supply, etc.

50. A key plan, showing the positions of the various town planning and suburban schemes, was published with the last report, but is not being re-issued this year, as material for a more accurate map is not yet available. With the completion of the survey of the suburban area, it is hoped to produce a much better map for inclusion in the next year's report.

SALSETTE-TROMBAY RAILWAY.

51. *Suburban Scheme No. XVII.*—The construction of 7·90 miles was sanctioned and put in hand during the year, *viz.*—

Andheri-Kurla	5·90	miles.
Kurla-Vadavli	2·00	„
Total	7·90	miles.

The Southern Section from Vadavli to Pir Pau, about 2·62 miles, will not be commenced until Suburban Scheme No. IV is ready to be taken in hand; its actual location is not finally settled pending the detailed examination of this scheme. Up to the end of March, 30 per cent. of the earthwork between Kurla and Chakala had been completed, whilst, that between Chakala and Andheri had been finished. Between Kurla and Vadavli, 25 per cent. of the earthwork had been done. The heaviest portion of the construction is at Kurla, where the line crosses the G. I. P. Railway overhead, and the G. I. P. Railway have been asked to design and estimate for the necessary bridgework, which they have agreed to construct. The earthwork and bridges will be built for double line, but only a single track will be laid in the first instance.

52. The construction stock ordered consists of 8 locomotives and 250 side tip wagons, and, of these, 4 locomotives and 160 wagons had been received by the end of the year. The portion of the railway now under construction will serve Schemes III and XVI and, eventually, when the section south of Vadavli is taken in hand, Scheme IV as well. During the period of development of these schemes, the line will be worked as a construction railway for the carriage of road making and building materials, and temporary sidings to give access to quarries and to schemes shortly to be undertaken, have been located. The nett cost of the construction stock, and the cost of working, will be met by the charges to the various schemes for the transport services rendered. The cost of the line itself, *i.e.*, the formation and bridges, will be recovered directly from the schemes to be served in the form of a small additional charge per square yard of developed land. When the schemes are complete, it is intended to convert the line into a high speed electric tramway to serve Schemes III, IV and XVI, and to interchange passengers with the G. I. P. and B. B. and C. I. Railways at Kurla and Andheri respectively, thus bringing these large areas into direct communication with the City. The permanent-way material was all received before the end of the year, whilst the necessary sleepers were either received or in transit.

THE ORGANISATION OF THE SUPPLY OF BUILDING MATERIALS.

53. During the year two Executive Districts were formed in the Materials Division, the Materials District, and the Mechanical District. Of these the former is concerned with the collection and distribution of materials and, in addition, with any civil engineering questions that arise in the Division. The Mechanical District deals with all Mechanical Engineering questions in the Division and with the maintenance of the Mechanical Transport, road rollers, etc., for the purposes of Nos. 1 and 2 Divisions.

54. *Shingle and Sand.*—Every possible source of supply within a radius of 100 miles has been investigated during the year, and whilst, for present use, supplies are being taken from various points, the probable future development will be a double source of supply, one being Mumbra on the Uhlas River, and the other Dahisar on the Vaiturna. At these sites the material will be obtained from the river by dredging pumps, two of which are on order, and graded by a wet screening process, after which it will be delivered into dumps for despatch by rail.

55. *Cement.*—During the year a contract was entered into with a group of four Indian Cement Companies for an option on their combined output up to 60,000 tons per annum, for 10 years, at actual cost plus 15 per cent. nett profit. Under the terms of the agreement it is open to the Municipal Corporation, the City Improvement Trust, the Public Works Department and the Port Trust to participate, and, with the exception of the Port Trust, all have decided to do so.

56. *Stone.*—It has not been found necessary to supply stone through the agency of the Materials Division for road making, but the possibility of its use as an aggregate for reinforced concrete has been considered. Ten tons of selected stone were sent to England for test by the best known makers of crushing plant, but the results were disappointing owing to the unsatisfactory nature of the fracture, and, as it was found possible to keep up a full supply of shingle, no further steps have been taken in the matter.

57. *Bricks.*—During the year land was acquired near Wasind and two kilns are being worked by contract. In these the attempt has been made to manufacture a higher class of bricks than is customary in the neighbourhood. At present there is no great demand for bricks, but possible sites for further kilns have been investigated and if a demand arises it can be dealt with. Investigations into the possible advantages of machine made bricks are in progress.

58. *Transport.*—It was pointed out in last year's report that the high cost of building materials in Bombay was largely due to inadequate and therefore expensive transport. The most expensive part is the road haul, and steps were therefore taken during the year to provide siding communication for the more important works of the Directorate. These resulted in somewhat lengthy negotiations with the authorities concerned but arrangements have been made for the construction of standard gauge sidings to serve the Worli and DeLisle Road housing schemes. A group of sidings was completed at Matunga for the supply of materials for the Naigaum housing scheme, and for the use of the lessees of the Improvement Trust Dadar Matunga Estate, whilst arrangements were also made with the G. I. P. Railway for an extension of the sidings at Mumbra for dealing with the sand traffic. The motor lorries referred to in the last report were purchased early in the year under review, twelve steam lorries, and six trailers, and are employed in transporting materials for Nos. 1 and 2 Divisions, as well as for the Colaba Division of the Reclamation Branch. The 150 broad-gauge wagons referred to last year were ordered through

the agency of the G. I. P. Railway and some of them were practically ready on 31st March 1922. Negotiations are in progress for the hire of the wagons to the Railway, under Indian Railway Conference Rules, on th understanding that the wagons or an equivalent tonnage, will always be available for the carriage of building materials for the Directorate and the public.

59. *Waterway at Thana.*—With a view further to augment the means of transport, investigations were carried out last year into the possibility of cutting a navigable channel through the rocks at Thana to facilitate communication by boat between the Ulhas River, the main source of supply of bricks, sand and shingle, and Bombay. As a result a project has been prepared for the construction of a channel giving five feet depth of water at half tide, and it is hoped to take the work in hand next cold weather. It is curious that two such important inland waterways as the Ulhas River and the Thana Creek should have been allowed, for so long, to remain virtually separated, except at the highest tides, by what is, from an engineering point of view, a comparatively unimportant obstruction.

60. Apart from the question of transport, the cost of building materials must depend on the cost of living of those classes by whom the materials are obtained or made. Until there is a sensible reduction in the cost of living of the labouring classes, it is hardly possible to expect any substantial reduction in the cost of the ordinary building materials.

BOMBAY SUBURBAN SURVEY.

61. The Bombay Suburban Survey preliminary establishment was sanctioned in April 1921 and during that month arrangements were made regarding the purchase of instruments and the recruitment of staff. In May 1921, the traverse survey of the villages on Trombay Island was commenced with staff of 3 traverse surveyors who worked throughout the monsoon months; progress was slow owing to heavy and persistent rain, but by August sufficient traverse data was prepared to justify the commencement of detail surveys, and by degrees the staff, consisting of 2 Inspectors and 12 detail surveyors, was recruited to undertake that work. The Assistant Superintendent was appointed in October and a staff of 8 levelling surveyors in December. Levelling operations were started in the areas lying north and south of the Sion Trombay road, and along the road from Chembur to Mahul; lines of levelling at intervals of approximately 350 feet have been run with the object of entering 5

foot contours on the survey maps. The Assistant Superintendent, besides supervising the work of the levellers in the field and the plotting of the level lines in office, has personally carried out the Bench Mark levelling and fixed the heights of 12 Bench Marks in Trombay.

62. During the year under review the area traversed amounted to 29,080 acres or 45·5 square miles, and the area surveyed in detail, on the scale of 16 inches to one mile, or 330 feet to 1 inch, amounts to 21,120 acres or 33 square miles. The area surveyed in detail comprises the whole of Trombay Island which contains 12 villages, and the following villages in Central and South Salsette:—Kole Kalyan, Shahar, Bapnala and Bamanwada, and parts of Kurla, Kirol, Mohili, Marol, Chakala, Gundauli, Mogra, Vile Parle, Dhanda and Bandra. On Trombay Island, heights have been given to 12 Bench Marks which are situated on the main roads at intervals of approximately one mile. Detail levelling for contouring purposes has been completed over an area of about 6,720 acres or 15 square miles.

63. The new maps, which have been surveyed on the scale of 16 inches to 1 mile, are of an uniform size, 16 inches wide and 24 inches long, representing an area one mile in width and 1½ miles in length. All physical features have been shown, with levels and 5 foot contours in those areas which are expected to come under immediate development; cultivated areas have been distinguished from gardens and waste lands, and "pucca" buildings from "kutcha" and boundaries have been entered of all villages, gaothans, non-agricultural numbers, roads, salt pans, notified areas, Government, Railway, Municipal and Port Trust properties. It is hoped to have a number of the sheets printed during the Monsoon, when they will be available for sale to the public. A typical specimen sheet has been specially printed as Plate VIII to this report.

64. *Advisory Committees.*—During the year, the membership of the Advisory Committee for Bombay City was increased from 6 to 8, two additional members having been appointed by Government to represent the Bombay Presidency Trades Association and the working classes in Bombay. With the approval of both committees the plan was adopted of holding joint meetings. A number of important questions were discussed and the opinion of the Committees recorded for the information of Government. The experience of the past year has shown the great utility of the Committees in keeping the Directorate in touch with public opinion, and when development reaches a more advanced stage their

advice and assistance will be invaluable. In addition to the usual meetings the Committees inspected works in progress on the relcamation and housing schemes.

INSPECTION BY MEMBERS OF THE LEGISLATIVE COUNCIL.

65. During the session of the Legislative Council in February 1922, arrangements were made for members to visit the Kandivli Quarry and the Reclamation works at Marine Lines, and a large number availed themselves of the facilities provided for inspecting the progress of these schemes.

ORGANISATION OF DIRECTORATE.

66. The organisation of the Development Directorate is given in Appendix C to this report.

67. *Conclusion.*—In conclusion an attempt may be made broadly to visualise the dimensions of the programme which has been undertaken, taking as the basis the estimated population which the several schemes will accommodate. On a conservative basis the figures may be taken as under :—

Scheme.	Estimated population provided for.
Back Bay and East Colaba Reclamations ..	50,000
Housing Scheme of 50,000 tenements	2,50,000
Suburban Schemes already notified	3,00,000
Total ..	6,00,000

or about half the present population of Bombay. In addition a large population will be accommodated in the Improvement Trust Schemes in the north of the Island; at Colaba, on the removal of the railway yards and cotton green ; and in the various Town Planning schemes in the suburbs, where much land still remains to be built on. Altogether it will probably not be very far wide of the mark to take 9 lakhs as the total population that all the schemes in progress or contemplated will accommodate. There is thus a prospect that, before many years, the Improvement Trust will be able again to take up actively the improvement of slum areas in the City, which has remained in abeyance owing to the impossibility of finding accommodation for the people dishoused. In this connection it is necessary once more to emphasise that the first

essential to such a large dispersal of the population as is involved in the above figures is the provision of means of rapid transit. To quote from the poster to be seen in many District Railway trains in London :—

THE GROWTH OF LONDON.

ALL DEVELOPMENT MUST BE BASED ON RAILWAYS. THEY ALONE CAN PROVIDE THE SPEED AND CAPACITY NECESSARY TO A HEALTHY GREATER LONDON.

And this applies to Bombay even more than to London, in view of the configuration of the Island with its single narrow outlet to the north. It is matter for congratulation that, thanks to the powerful advocacy of His Excellency Sir George Lloyd, it is believed that the electrification of the suburban services of the G. I. P. and B. B. & C. I. Railways has been definitely included in the five year railway programme commencing on 1st April 1922.

H. A. L. HEPPER,

Director of Development.

APPENDIX A.

Prior to the war the question of the land held by the Military Department in Bombay had been under discussion for many years, Government on the one side desiring to obtain the release of some of the scattered military properties in the Fort area for purposes of commercial expansion, the Military authorities on the other hand being unable to fall in with these views owing to their inability to find other sites to reinstate the services that would be displaced. In 1911 a scheme for reclaiming Back Bay was put forward by the Local Government and specific provision was made for making available 100 acres for the Military Department at Rs. 7 per square yard, this being Mr. Kidd's estimate of the cost of the Reclamation, excluding interest charges. The proposal fell to the ground, however, as the Government of India did not see their way to sanction the Reclamation at that time, and little further progress was made till 1914 when negotiations remained in abeyance owing to the war. When the war was over, the Bombay Government took up the Back Bay Reclamation Scheme again and obtained sanction to it in 1920. At the same time, the Military Lands Scheme came forward in a larger form, the proposal being to relinquish practically the whole of the Military properties in the Fort area and to reinstate the various services partly on reclaimed land at Colaba, and partly at Deolali. At first, negotiations did not make much progress, as the area, said to be required for Military purposes at Colaba, was considered to be too large to be surrendered out of the Reclamation; but this was finally reduced to 265 acres.

2. On this basis a settlement was effected as follows:—

(*a*) The Government of India in the Military Department have agreed to relinquish the following properties and each plot, as vacated, is to be handed over to the Government of Bombay for disposal through the Development Department, on behalf of the Government of India :—

Serial No.		Area, square yds.
1.	Queen's Road	99,517
2.	Carnegy Lines	28,318
3.	Old Saluting Battery	5,600
4.	Castle Park Arsenal	42,099
5.	Old Town Barracks	14,545
6.	Old Garrison Stables	441

Serial No.	Description	Area, square yds.
7.	Old Executive Engineer's Office ..	1,832
8.	Palton Road Warrant Officers' Quarters	2,406
9.	Old Palton Lines	30,168
10.	Old Sailors' Home	899
11.	Seaside Villa	1,157
12.	Old Defence Office, Middle Colaba ..	6,008
13.	Ordnance Lascar Quarters, Middle Colaba	4,412
14.	Gun Carriage Factory, Middle Colaba ..	35,338

(*b*) The proceeds of these sales are to be credited to the Government of India and held in a special suspense account for the purposes of the scheme as follows :—

(i) To defray the cost of reinstating at Colaba or Deolali the services displaced by the sale of the properties above referred to, together with the provision of accommodation for such Military units now stationed in Bombay as would under ordinary rules have been given accommodation, but for whom no accommodation has, up to now, been provided owing to lack of sites, and

(ii) To meet the cost of 265 acres of reclaimed land at the southern end of the Back Bay Reclamation which the Government of Bombay have agreed to hand over to the Military Department in an undeveloped state, as soon as it is ready, at an all-over rate of Rs. 20 per square yard.

(*c*) In the case of any Military property to be disposed of, which may be required by the Government of Bombay or by local body, the rate for purposes of transfer is to be the market value which is to be settled by agreement, or, failing agreement, by arbitration, an arbitrator mutually agreed upon to be assisted by two assessors, one selected by each party to the arbitration.

(*d*) The Military buildings and works, referred to in paragraph (*b*) (*i*), are to be included in a schedule of requirements to be prepared by the Military Department for the acceptance of the Government of Bombay. No additions to the schedule are to be made, subsequent to its acceptance, without the approval of the Government of Bombay.

(*e*) The construction of the Military buildings at Colaba and Deolali is to be carried out by a special engineering establishment to be provided by the Government of India in the Army Department, under the joint

administrative control of the Director of Development and the General Officer Commanding, Bombay District, to whom considerable powers have been delegated by the Government of India. The Accounts Officer of the Development Department will also be the Accounts Officer for the purposes of the maintenance of the special account of Military receipts and expenditure and his powers and functions in this respect will be similar to those which he exercises under the Development Scheme.

(*f*) If, after meeting budget requirements for immediate and prospective Military buildings and works under the scheme, funds are available from the suspense account, the Government of India will be prepared to make advances to the Government of Bombay, on terms to be arranged, against the cost of the reclaimed land to be handed over to the Military Department, to assist the Government of Bombay in financing their part of the work.

(*g*) If the whole transaction results in a profit, such profit is to be shared between the Government of India and the Government of Bombay, the Government of Bombay receiving 50 per cent. of the first crore, 40 per cent. of the second crore and 30 per cent. of the third crore in return for their assistance in carrying out the scheme.

3. It is not possible to forecast whether the scheme will result in a profit, that is, whether the proceeds of the sale of the properties detailed in paragraph 2 (*a*) will exceed the expenditure indicated in paragraph 2 (*b*) or the reverse. But whilst the Government of Bombay stand to share the profit, if there is one, they incur no liability should the scheme result in a loss.

4. As regards the rate of Rs. 20 per square yard at which the Government of Bombay have agreed to sell 265 acres of reclaimed land at Colaba, the following indicates how the rate was arrived at. The most important fact to remember in this connection is that 64 acres out of the area to be made available for the Military Department forms a sector which falls within the zone of fire of the Colaba Battery and has no value as residential land, since it can in no case be built on. As already stated, it was proposed in the Reclamation Scheme put forward in 1911, to sell 100 acres of reclaimed land to the Military authorities at cost price, excluding interest charges, and, in connection with the negotiations leading up to the present settlement, it was felt that this former offer could not altogether be ignored. It was considered, however, that interest charges during construction could fairly be included in a cost price figure and it was decided to offer 100 acres at Rs. 10 per square yard as cost price *plus*

interest, and the balance, 165 acres, at the market value. It will be understood that the land will be handed over to the Military authorities in an undeveloped condition, that is without roads, drains, etc., and it was decided to base the value on the probable market value of developed plots in the area at the time of transfer in 1926 or 1927. This must largely be a matter of conjecture, but, for purposes of calculation, it was taken at Rs. 40 per square yard, and the corresponding value for undeveloped land at Rs. 25 per square yard. It will be realised that in actual practice, Rs. 40 per square yard could not be obtained in the market on the date of transfer to the Military Department, because several years would be required to make the roads and drains and to dispose of the plots to the public. So that, in basing the value on a market value of Rs. 40 per square yard for developed land at the date of transfer, Government were really assuming a value considerably higher at the date they would be in a position to sell to the public.

5. The land was accordingly offered to the Government of India on the following terms:—

	Lakhs. Rs.	Lakhs. Rs.
100 acres at Rs. 10 per square yard ..	48·40	
165 acres at market value calculated for undeveloped land at Rs. 25 per square yard	199·65	248·05
Subject to the proviso that at the time of handing over the land it might be open to either side to ask for reconsideration of the rate of Rs. 25 for undeveloped land, the rate, if necessary, to be settled by arbitration ;		
or, in the alternative, the land was offered at a fixed all-over rate of Rs. 20 per square yard.		
265 acres at Rs. 20 per square yard ...		256·52

The fixed all-over rate of Rs. 20 was accepted by the Government of India.

6. Since the agreement was made, revised figures of the cost of the Reclamation have been prepared and the result was communicated to the Indian Merchants' Chamber and Bureau in a reply to a communication submitted by them. In accordance with these figures, the total

cost of the Reclamation at the time of transfer of land to the Military Department, including interest, will be Rs. 618 lakhs, equivalent to Rs. 11 per square yard, and, as the figures referred to are believed to be an over-estimate, it is not in the least likely that Government will lose by having fixed the cost price at Rs. 10. In any case Government will receive from the Military Department for the whole area about double what the land will at that date have cost them. Under the circumstances, Rs. 20 per square yard which this Government will get for the 265 acres is considered to be reasonable, especially in view of the fact already stated that 64 acres thereof will have no value for building purposes. Further, Government will receive a share of any profit on the whole transaction, whilst the public and public bodies will secure the use of valuable sites in the heart of the Fort for commercial or public purposes. The Military, on the other hand, will obtain land which will enable them to provide up-to-date accommodation for the Indian Infantry Regiment and for other services, together with sufficient open space for the erection of temporary camps when necessary, thus avoiding the use for such purposes in future of the existing open spaces allotted to the public.

APPENDIX B.

Government have had for some time under their consideration the possibility of undertaking a combined reclamation and development scheme in Colaba, the reclamation being on the harbour side of the island. Mr. A. E. Mirams, Consulting Surveyor to Government, submitted in May 1919 an outline of such a scheme, providing for the reclamation of about 139 acres, and the development, *inter alia*, of the large areas now occupied by the Cotton Green and the G. I. P. and B. B. and C. I. Railways. Mr. Mirams submitted figures indicating that in his opinion the scheme would be highly profitable.

2. In 1920 Government arranged that the estimates of the cost of acquisition of land and buildings underlying Mr. Mirams' figures should be examined by Mr. R. H. A. Delves, Estate Agent, City of Bombay Improvement Trust, and that Mr. Mirams' proposals in regard to reclamation should be reported on by Sir George Buchanan. After considering the reports of these gentlemen, Government decided that for the present attention ought to be concentrated on that portion of Mr. Mirams' scheme, which involved the reclamation of land from the sea, and that consideration of his larger proposal ought to be postponed until the Cotton Green had actually been transferred or was about to be transferred to Sewri, and until the railways and the military were ready to move out of the area to which Mr. Mirams' scheme related. The Development Directorate was then instructed to submit proposals.

3. The Director of Development has now submitted preliminary proposals, a preliminary layout plan prepared by the Land Manager, and a provisional rough estimate prepared by the Chief Engineer, Reclamation Branch.

This scheme provides for the reclamation of 131·75 acres and the whole area to which the scheme relates, including 2·28 acres proposed to be acquired amounts to 134·03 acres to be distributed as under:—

	Acres.
Building sites	84·84
Open spaces	7·98
Roads	41·21

The net building area is thus approximately 4·1 lakhs of square yards.

4. The total expenditure required, including cost of reclamation, acquisition of land, construction of roads, with drains and lighting, and the layout of open spaces is estimated at approximately Rs. 87½ lakhs to be expended as under :—

	Rs.
1st year	13 lakhs.
2nd „	11 „
3rd „	14 „
4th „	12 „
5th „	25 „
6th „	12½ „
Total	87½ „

Allowing for interest on capital throughout at 7 per cent., it has been calculated that the total cost of each yard of the developed building area at the end of the 6th year from the commencement of expenditure on the scheme will be rather less than Rs. 26.

5. In view of the information which has been placed before them and which is summarised above, Government have decided that the East Colaba Scheme should be approved administratively, and that the Chief Engineer, Reclamation Branch, should be instructed to prepare and submit for sanction detailed plans and estimates, in time to enable work to be started in October 1922, if the detailed estimates have meanwhile been sanctioned, and if funds have been provided in the budget for 1922-23. In the event of the amount of the detailed estimates for works differing materially from the total of the rough estimates underlying the figures quoted above, Government propose to reconsider the scheme, and it should be understood that no expenditure on works in anticipation of sanction to the detailed estimates has been, or will be, authorised.

6. Mr. W. R. Davidge, Consulting Town Planner, should be requested to place before Government his proposals for the layout of this area.

7. Copies of this Resolution should be forwarded to all Members of the Legislative Council and they should be requested to refer to Mr. Davidge's preliminary layout plan of the Back Bay Reclamation, on which they will find the proposed East Colaba Reclamation clearly marked. They should be informed that it is the intention of Government, provided that the detailed estimates which have been called for

do not differ materially from the rough estimates referred to in this Resolution, to ask for a grant of Rs. 13 lakhs in respect of this scheme in the budget for 1922-23.

The total expenditure involved in the scheme, including interest at 7 per cent. during the six years required for the completion of the works, has been calculated at Rs. 1,06,38,900. This is the expenditure to which Government will be committed in the event of the Legislative Council voting the grant to be asked for in next year's budget.

The above figure divided by 4,10,626, the number of square yards in the estimated building area, gives the amount of just under Rs. 26 per square yard which has been stated in paragraph 4 as the estimated cost to Government of each square yard of land, completely developed, six years after the work is commenced.

APPENDIX C.

Development Directorate.

Designation.	Name.
1. Director of Development	Sir Lawless Hepper, Kt.
2. Deputy Director of Development, Secretary to Government, Development Department and Commissioner of Bombay Suburban Division.	P. W. Monie, Esquire, C.S.I., I.C.S.
3. Deputy Secretary to Government, Development Department, Secretary to the Development Directorate and Assistant to the Commissioner, Bombay Suburban Division.	H. St. C. Smith, Esquire.
4. Assistant Secretary to Government, Development Department.	R. B. Vachha, Esquire, M.A.
5. Assistant Engineer, Development Directorate.	J. A. Gayer, Esquire, (on leave.)
Reclamation Branch.	
6. Chief Engineer, Reclamation Branch.	Ll. W. Lewis, Esquire, C.I.E., M.I.C.E.
7. Senior Deputy Chief Engineer, Reclamation Branch.	G. M. O'Rorke, Esquire, C.I.E., M.E., B.A.I., A.M.I.C.E.
8. Junior Deputy Chief Engineer, Reclamation Branch.	H. A. Elgee, Esquire, M.I.C.E.
9. Junior Deputy Chief Engineer, Reclamation Branch.	P. Billinton, Esquire.
10. Personal Assistant to the Chief Engineer, Reclamation Branch.	G. D. Khanna, Esquire.
11. Executive Engineer, Projects ..	W. H. Thomas, Esquire, A.C.G.I., A.M.I.C.E.
12. Marine Surveyor	Lieut. Comr. A. F. Crutchley, D.S.O.
13. Assistant Engineer	C. G. Croudace, Esquire.
14 Do.	S. M. Abdulla, Esquire.
15. Do.	P. Malone, Esquire, A.M.I.C.E., A.M.I.M.E.
16. Quarry Master	E. O. Roberts, Esquire.
17. Mechanical Engineer, Quarry ..	W. H. Morris, Esquire, (on leave) Mr. A. Bellenfontaine (acting).

APPENDIX C—*contd.*

DEVELOPMENT DIRECTORATE—*contd.*

	Designation.	Name.
	No. 1 PROJECT DIVISION.	
18.	Superintending Engineer, No. 1 Project Division.	T. Harvey, Esquire, M. Sc M.I.C.E.
19.	Executive Engineer, Bombay Housing District No. 1.	N. L. Mehta, Esquire, B. S. (Lon.), D. Sc. (Paris).
20.	Executive Engineer, Bombay Housing District No. 2.	A. Hamid, Esquire, F. Sc.
21.	Assistant Engineer, Bombay Housing District No. 1.	S. P. Raju Iyer, Esquire.
22.	Do. ..	Captain C. Carmichael.
23.	Assistant Engineer, Bombay Housing District No. 2.	M. H. Guzdar, Esquire, B.E.
24.	Do. ..	M. A. Dhoria, Esquire, B.A., B.E.
	No. 2 PROJECT DIVISION.	
25.	Superintending Engineer, No. 2 Project Division.	D. R. H. Browne, Esquire O.B.E.,
26.	Executive Engineer, Andheri District.	D. K. Bhave, Esquire, L.C.E., M.A., B.Sc., A.M. Inst. C.E. A.M.I. Mech. E.
27.	Executive Engineer, Suburban Sanitary District.	T. S. Soorma, Esquire, B.E.
28.	Executive Engineer, Kurla Trombay District.	G. W. T. Squires, Esquire.
29.	Assistant Engineer, Ghatkoper..	M. J. Date, Esquire.
30.	Assistant Engineer, Chembur..	B. M. Flores, Esquire, B.E.
	No. 3 PROJECT DIVISION.	
31.	Superintending Engineer, No. 3 Project Division.	Captain A. F. Macdonald Clark, M.A., B.Sc., M.I.C.E.
32.	Executive Engineer, Ambernath Water Projects.	J. N. Setna, Esquire, (acting) L.C.E., B.Sc.

APPENDIX C—*contd.*

DEVELOPMENT DIRECTORATE—*contd.*

	Designation.	Name.
	No. 2 PROJECT DIVISION—*contd.*	
33.	Assistant Engineer, in charge Ambernath Development.	H. K. Wacha, Esquire, B.A., B.E.
34.	Executive Engineer, Mechanical..	A. Lennox Stanton, A.M.I. M.E., A.M.I.E.E.
35.	Executive Engineer, Central Salsette Railway.	T. A. Pereira, Esquire.
36.	Assistant Engineer	F. J. Campos, Esquire.
37.	Do.	R. S. Borker, Esquire.
38.	Do.	D. D. Joglekar, Esquire, L.C.E.
39.	Do.	T. V. Sundaresan, Esquire, B.A., B.E.
40.	Do.	R. D. Kamarker, Esquire, L.C.E.
	No. 4 PROJECT DIVISION.	
41.	Superintending Engineer, No. 4 Project Division.	E.F. Sykes, Esquire, M.I.C.E.
42.	Executive Engineer, Mechanical District.	W. K. Caldwell, Esquire.
43.	Executive Engineer, Materials District.	J. R. Colabawalla, Esquire, M. Soce. (Lon.), A.M.I.E. (India), A.M.I.E.E.
44.	Assistant Engineer	Lala Kanhiyalal (on leave).
45.	Do.	Sirdar Kala Singh.
46.	Do.	D. N. Limaye, Esquire.
	SUBURBAN SURVEY.	
47.	Superintendent, Bombay Suburban Survey.	W. J. Newland, Esquire.
48.	Assistant Superintendent, Bombay Suburban Survey.	S. G. Narvane, Esq., (E. M. Columbia University, New York).

APPENDIX C—*contd.*

DEVELOPMENT DIRECTORATE—*contd.*

	Designation.	Name.
	LAND ACQUISITION, BOMBAY.	
49.	Land Acquisition Officer for the City of Bombay.	G. C. Rowe, Esquire.
50.	Assistant Land Acquisition Officer for the City of Bombay.	D. R. Vaidya, Esquire, (on leave).
51.	Assistant Land Acquisition Officer for the City of Bombay.	H. V. Date, Esquire, B.A.
52.	Personal Assistant to the Land Acquisition Officer for the City of Bombay.	S. D. Nariman, Esquire, B A.
	LAND MANAGER, DEVELOPMENT DIRECTORATE.	
53.	Land Manager, Development Directorate.	E. M. Gilbert Lodge, Esquire F.S.I., F.I.A., F.A.I.
54.	Assistant Land Manager, Development Directorate.	K.R. Doctor, Esquire, L.C.E.
55.	Special Assistant Land Manager, Development Directorate.	D. G. Sowani, Esq., B. Sc., B.E.
	SALSETTE DEVELOPMENT.	
56.	Collector, Bombay Suburban District, and Salsette Development Officer.	G. E. L. Carter, Esquire, I.C.S.
57.	Assistant Development Officer, Kurla.	D. M. Randive, Esquire, B.A.
58.	Assistant Development Officer, Ambernath.	P. H. Diwan, Esquire.
59.	Assistant Development Officer, Trombay.	A. K. Nulkar, Esquire.
60.	Additional Assistant Development Officer, Trombay.	J. D. Nanavati, Esquire, B.A.
61.	Deputy Collector and Personal Assistant to the Salsette Development Officer.	H. C. Fleming, Esquire.
	AUDIT OFFICE, BOMBAY DEVELOPMENT SCHEME.	
62.	Audit Officer, Bombay Development Scheme.	S. M. L. Bean, Esquire.

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